A recent paper on the sand or dwarf cherries by Catling, McKay-Kuja, & Mitrow (1999) prompted my re-examination of these plants in Wisconsin and neighboring states. I had previously examined specimens of sand cherries from across their range in North America as part of my treatment of Prunus for the Flora of North America project. Historically, botanists have been divided on how best to treat taxonomically the variation among sand cherries. Those from the late nineteenth and early twentieth centuries who specifically studied the genus Prunus (Bailey 1892, 1894; Wight 1915; Fernald 1923) ultimately split the sand cherry into four separate species: Prunus besseyi Bailey, P. depressa Pursh, P. pumila L., and P. susquehanae Willd. (= P. cuneata Raf.). Yet others had doubts as to whether the variation warranted recognition at the species level. For example, Groh & Senn (1940: 328) wrote, “We are unable to follow Fernald in recognizing as distinct species the three sand cherries of Eastern Canada. . . . These entities show a complex series of intergradations in the morphological characters which Fernald uses to separate them. . . . Additional collections seem to be rapidly destroying any supposedly definite boundaries between these forms. Consequently since there is considerable intergradation in morphological characters and not too sharply delimited geographical ranges we consider that these sand cherries should be regarded as varieties of a polymorphous species rather than as distinct species.” In the two great mid-twentieth-century floras for the northeastern quarter of the United States and adjacent Canada, Fernald (1950) maintained four species of sand cherry, whereas Gleason (1952) recognized four varieties of a single species (Prunus pumila s.l.).

More so than those from other regions, Midwestern botanists had great difficulty in sorting the local variation among sand cherries into the distinct species of Fernald (or the varieties of Gleason). Deam (1940: 580), working on the flora of Indiana, stated, “Prunus cuneata and Prunus susquehanae are named forms of Prunus pumila which I do not regard as of taxonomic value.” In Michigan Flora, Voss (1985: 370) called the sand cherry, “a variable species, the extremes distinctive but thoroughly intergrading.” The situation is similar in Wisconsin, where Mason & Iltis (1958: 91) commented “Prunus pumila, sensu lato, is very variable in Wisconsin, with only the extremes separable into the above-named forms [P. pumila and P. susquehanae]. In plotting the length vs. width of leaves of all Wisconsin collections, it is clear, however, that the extremes are at either end of a continuous variation pattern. Since most specimens fall between the
above named morphological extremes, they cannot be assigned to one or the other of the varieties or species. For this reason the segregate taxa are not recognized here. A detailed study of this species throughout its range would seem highly desirable.”

Catling and his colleagues (1999) introduced a new character, pubescent twigs, by which *P. susquehanae* could be distinguished from other members of the sand cherry complex. As a result they recognized two species: *P. susquehanae* and *P. pumila*, the latter with three varieties. In pursuing this study I had several questions in mind. By using this new character, could some sense finally be made of the variation in sand cherries in Wisconsin, Michigan, and Indiana, where before intergradation in other characters had led to the recognition of a single variable species? If species or varieties can be recognized in the Midwest, which characters are most useful? What are the geographic distribution and ecological habitat of each taxon? And, why did Midwestern botanists seem to have more problems with recognizing species or varieties of sand cherry than Eastern botanists?

**VARIATION IN KEY MORPHOLOGICAL CHARACTERS**

**Twigs**

Indeed, pubescence on the twigs seems to be the key to solving much of the puzzle of variation in Midwestern sand cherries. The hairs are so short as to be imperceptible to the unaided eye and magnification of at least 10× is required. As much as I hoped that all twigs would be either densely puberulent or glabrous, thus allowing me to easily segregate species as Catling et al. (1999) suggested, this was not the case. About 8% of the specimens that I examined had a sparse pubescence on the twigs, quite unlike the dense minute pubescence illustrated by Catling et al. Many of these specimens were from the Great Plains where all floras list *P. besseyi* as the only indigenous sand cherry. Based on their other characters, these specimens are clearly *P. besseyi*. Thus the presence of any hairiness on the twig cannot be used definitively to identify *P. susquehanae*. To further complicate the picture in the Midwest, there were a few specimens from northern portions of Minnesota, Wisconsin, and Michigan, that although they had glabrous twigs, seemed to otherwise fit the description of *P. susquehanae*. All specimens of *P. pumila s.s.* examined had completely glabrous twigs. The same was true for *P. depressa* with the exception of two specimens that otherwise had the characters and habitat of *P. depressa*.

**Habit**

Sand cherries are shrubs, commonly less than a meter in height, but potentially up to 2.5 m high in plants of the Great Lakes sand dunes. The posture of the major stems, whether erect, ascending, decumbent, or prostrate, has been of great importance in separating the four taxa. *P. depressa*, as its name suggests, is best defined by its prostrate habit. The main stems lie flat on the substrate and
radiate outward with the erect branches forming a low mat, no more than half a meter in height. The other three taxa typically have erect or at least ascending stems. However, in each it is not unusual to find some decumbent or prostrate stems in the same colony as erect-ascending stems, thus leading to the plant’s potential misidentification as *P. depressa*. I am convinced that *P. depressa* is an eastern entity, not found in Wisconsin or its neighbors, and that reports of *P. depressa* from Wisconsin almost certainly are based on decumbent or prostrate plants of *P. pumila*.

**Leaves**

Overall leaf shape, blade length-to-width ratio (l/w), and shapes of the blade apex and base have been widely used to distinguish the four sand cherry taxa. In addition, differences in blade width, thickness, color, and serration have been used in keys, and differences in the lengths of petioles and stipules implied in descriptions. Many of these characters, such as sharpness of serrations, thickness, and paleness of the lower leaf surface, are qualitative or difficult to measure with precision. For instance, in his key Fernald (1950) used the texture descriptors “subcoriaceous,” “firm-membranous,” “becoming coriaceous,” and “submembranaceous” to distinguish among *P. pumila*, *P. susquehanae*, *P. besseyi*, and *P. depressa*, respectively. Although most leaves of *P. besseyi* are noticeably thicker than those of *P. depressa* when the two are compared side by side, when identifying a single specimen of sand cherry it is difficult to be certain whether the better choice in the key might be “subcoriaceous” or “becoming coriaceous.” Among the sand cherries leaf thickness and texture vary continuously from that typical for a temperate-zone plant to decidedly thicker and somewhat leathery. The same continuous variation is seen in most of the other qualitative leaf characters.

Characters that can be quantified, and thus tested statistically, are leaf lengths and widths, as well as the ratio between them. Three mature leaves from each of 127 specimens from Wisconsin and 207 specimens from other states were measured for length and width and then averaged per specimen and analyzed (Table 1). Leaves of *P. depressa* are typically oblanceolate with an obtuse or less commonly acute apex. They are longer on average than leaves of the other varieties

<table>
<thead>
<tr>
<th>Taxon</th>
<th>n</th>
<th>Length (cm)</th>
<th>Width (cm)</th>
<th>L/W Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>besseyi</td>
<td>Wisconsin 41</td>
<td>4.98 (5.07) ± 0.95</td>
<td>1.74 (1.80) ± 0.42</td>
<td>2.94 (2.81) ± 0.48</td>
</tr>
<tr>
<td></td>
<td>Elsewhere 86</td>
<td>4.40 (4.37) ± 0.82</td>
<td>1.57 (1.57) ± 0.34</td>
<td>2.86 (2.81) ± 0.36</td>
</tr>
<tr>
<td>depressa</td>
<td>Elsewhere 22</td>
<td>5.38 (5.38) ± 0.96</td>
<td>1.47 (1.43) ± 0.25</td>
<td>3.70 (3.69) ± 0.48</td>
</tr>
<tr>
<td>pumila</td>
<td>Wisconsin 34</td>
<td>4.90 (4.90) ± 0.90</td>
<td>1.53 (1.55) ± 0.36</td>
<td>3.29 (3.24) ± 0.58</td>
</tr>
<tr>
<td></td>
<td>Elsewhere 39</td>
<td>4.63 (4.63) ± 0.67</td>
<td>1.41 (1.37) ± 0.28</td>
<td>3.36 (3.28) ± 0.54</td>
</tr>
<tr>
<td>susquehanae</td>
<td>Wisconsin 52</td>
<td>4.73 (4.80) ± 0.71</td>
<td>1.86 (1.87) ± 0.35</td>
<td>2.60 (2.54) ± 0.31</td>
</tr>
<tr>
<td></td>
<td>Elsewhere 60</td>
<td>4.85 (4.87) ± 0.71</td>
<td>1.94 (1.95) ± 0.36</td>
<td>2.55 (2.49) ± 0.38</td>
</tr>
</tbody>
</table>
and are nearly always at least three times longer than wide, averaging 3.7:1. At the other end of the spectrum is *P. susquehanae* where 99 of the 112 specimens that I measured (88%) had a l/w ratio less than 3:1. Their leaves are elliptic to obovate with the apex generally obtuse but varying from acute to rounded. From Quebec and New England to southern Pennsylvania where these are the only taxa present, they are readily distinguished, perhaps explaining why Fernald and other Eastern botanists recognized them as distinct species.

*Prunus pumila* of the Great Lakes shores has leaves that are elliptic to oblanceolate, or sometimes obovate, usually with an acute apex. Although the keys of Fernald (1950), Gleason & Cronquist (1991), and Catling et al. (1999) give a l/w ratio of at least 3:1, 35% of the Wisconsin specimens that I measured and 26% of those from elsewhere had ratios less than that. The presence of *P. besseyi* in Wisconsin, Minnesota, Illinois, and Indiana further complicates using leaf measurements to distinguish the varieties. The l/w ratio of *P. besseyi* is intermediate between *P. pumila* and *P. susquehanae*, averaging 2.9:1. Although the leaves of *P. besseyi* from the Plains States are distinctly smaller, in Wisconsin and its neighbors they are of comparable size and shape to other sand cherries. They can be elliptic, oblanceolate, or obovate in outline with an acute, short acuminate, or obtuse apex. Unfortunately a sand cherry collected from Wisconsin with leaves averaging 4.9 cm long by 1.7 cm wide (l/w = 2.88) could be any one of our three taxa.

I also did a preliminary analysis of petiole and stipule lengths, but abandoned a fuller study when the means and ranges were similar among the four taxa.

**Fruits**

Fruits are described as varying meaningfully in size and taste, as well as in the size and shape of the pit. Fernald (1923, 1950) described the taste of *P. depressa* as acid, but of rich quality, more palatable than those of *P. pumila*, which he called astringent. Those of *P. besseyi* he reported as sweet and fleshy. I have tasted fruits of the three taxa found in Wisconsin, and the only conclusion I could draw is that fruit taste varies considerably, even among fruits of the same shrub and certainly within the same taxon. Mature fruits of *P. besseyi* do seem to be slightly larger, on average, than those of *P. pumila* and *P. susquehanae*, but I did not measure fresh fruits from enough wild populations to make a definitive statement. More than the other taxa, *P. besseyi* has been cultivated for its fruits, and this may explain why some literature sources attribute a significantly larger size to them. I have measured fresh mature fruits of *P. pumila* from 8 to 15 mm in diameter, thus linking the size given by Fernald’s key (1950) for *P. pumila* with that of *P. besseyi*. Herbarium specimens cannot be used to measure fruit size. Either the mature fruits are smashed flat, thus inflating their size, or they have been dried without pressing and have shrunk. I measured ten fresh mature fruits of *P. pumila* and then dried them without pressing and measured them again. On average they decreased 17% in length and 30% in width. Pit size and shape can be reliably measured from herbarium specimens, but most specimens lack pits. I was able to collect data from 80 specimens representing all four taxa (Table 2). Pits of *P. depressa* are distinctively narrower than others and are more fusiform.
in shape. Otherwise I question the usefulness of pit length or width as a key character. Pits of *P. susquehanae* are somewhat shorter and narrower on average than those of *P. besseyi* or *P. pumila*, but there is too much overlap for this character to be useful in determining most specimens. I could not see any significant difference in the overall shape of their pits or the shape of the pit apex or base. There was simply too much variation, from nearly globose to ovoid stones, within each taxon.

**TAXONOMIC CONCLUSION**

After studying the literature and many specimens, as well as comparing variation in the sand cherry with taxonomic concepts in other North American species of *Prunus* such as *P. serotina*, my conclusion is to recognize one species of sand cherry, *P. pumila*, with four varieties (*besseyi, depressa, pumila*, and *susquehanae*). Although I agree with Catling et al. (1999) that the four sand cherry taxa are not equally distinct, as might be suggested by recognizing either four species or four varieties of a single species, I do not think that the differences between *P. susquehanae* and the other three taxa warrant their recognition as two species. The only morphological character separating *P. susquehanae* from the three varieties of *P. pumila* is pubescent twigs; in all other characters the range of variation in *P. susquehanae* broadly overlaps (much more than keys indicate) the variation seen in one variety or another of *P. pumila*. A reasonable, but also more cumbersome, taxonomic solution would be to recognize a single species with two subspecies: *P. pumila* subsp. *susquehanae* and *P. pumila* subsp. *pumila*, the latter with three varieties (*besseyi, depressa, and pumila*). (I do not accept these combinations, and explicitly disavow any intention of creating them.) Cochrane & Iltis (2000) have argued that the sand cherry is “a complex species of East-West ecotypes centered on two unglaciated survivals:” a short-leaved western ecotype (var. *besseyi*) from the Great Plains and a long-leaved eastern ecotype (vars. *depressa, pumila*, and *susquehanae*) from the Pennsylvanian Appalachians. If they are correct, then var. *besseyi*, rather than var. *susquehanae*, would be the more distinct taxon, at least evolutionarily. They state that “Wisconsin specimens exhibit thoroughly intergrading morphological variation” from one ecotype to the other. And, indeed they do. Yet even though the morphological characters show almost continuous variation, the differences in eco-

**TABLE 2.** Mean, (median), and standard deviation for length, width, and length- to-width ratios of pits for each taxon of sand cherry. *n* = number of specimens from which one to four pits were measured and averaged.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>n</th>
<th>Length (mm)</th>
<th>Width (mm)</th>
<th>L/W Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>besseyi</td>
<td>22</td>
<td>8.0 (8.0) ± 0.9</td>
<td>6.2 (6.3) ± 0.8</td>
<td>1.30 (1.29) ± 0.09</td>
</tr>
<tr>
<td>depressa</td>
<td>9</td>
<td>7.3 (7.4) ± 1.1</td>
<td>4.9 (4.9) ± 0.6</td>
<td>1.50 (1.50) ± 0.14</td>
</tr>
<tr>
<td>pumila</td>
<td>24</td>
<td>8.4 (8.2) ± 0.7</td>
<td>6.2 (6.1) ± 0.5</td>
<td>1.35 (1.33) ± 0.14</td>
</tr>
<tr>
<td>susquehanae</td>
<td>25</td>
<td>7.4 (7.5) ± 1.0</td>
<td>5.7 (6.0) ± 0.6</td>
<td>1.30 (1.30) ± 0.17</td>
</tr>
</tbody>
</table>
logical habitat and geographical range among the taxa argue for their recognition at some taxonomic rank. Until further research can illuminate the evolutionary relationships among these four taxa and the degree of gene flow among them, I believe the best solution is to stick with four taxa of equal rank within one variable species.

KEY TO SAND CHERRIES OF THE UPPER MIDWEST

Twigs of the current year densely and minutely pubescent (examine with at least 10× magnification); leaf blades often obtuse at apex and mostly 2.2–3.0× longer than wide; inhabiting open pine woods or barrens, or nearby sandy fields and roadsides across northern Minnesota and Wisconsin as well as much of Michigan south to Indiana.......................... P. pumila var. susquehannae

Twigs of the current year glabrous or rarely sparsely pubescent; leaf blades often acute at apex and mostly more than 2.5× as long as wide; inhabiting prairies, or shores of the Great Lakes.

Shrubs growing on prairies and nearby roadsides or on rock outcrops from northern Indiana and Illinois west to the Great Plains; leaf blades mostly elliptic to obovate, averaging 2.9× longer than wide ........... P. pumila var. besseyi

Shrubs growing on or near shore of the Great Lakes, typically on sandy beaches, dunes, or flats, much less commonly on rocky shores or pavements; leaf blades mostly oblanceolate, averaging 3.3× longer than wide

............................................. P. pumila var. pumila

SYNOPSIS OF MIDWESTERN SAND CHERRIES

Each variety is mapped for Wisconsin and neighboring states with a description of its broader distribution. Notes on habitats and the list of common associates are based on the occurrence of sand cherry in the Midwest as gathered from specimen labels and personal field experience. See Catling et al. (1999) for a review of synonymy and typification of names.

Prunus pumila var. besseyi (Bailey) Waugh—Western Sand Cherry

Distribution: Map 1; Manitoba south across the Great Plains to Colorado and Kansas, southeast to the northern regions of Illinois and Indiana. Occasional plants are found as far east as Michigan, Ohio, and southeastern Ontario.

Habitat: Prairies and relict oak savannas over sandy soil along rivers, railroads, and highways; rocky or sandy south- to west-facing hillside “goat prairies”; sandstone or limestone outcrops, ledges, or ridges; and occasionally in open jack pine or scrub oak forests and barrens. Across the Great Plains it is typically on sand hills and a component of the dry, short-grass prairie, but is also
found along the tops and dry slopes of limestone, sandstone, and quartzite ridges, outcrops, bluffs, and buttes.


**Prunus pumila** L. var. *pumila*—Great Lakes Sand Cherry

Distribution: Map 2; Along the shores of the Great Lakes from Minnesota and southwestern Ontario south to Illinois, Indiana, and Ohio; and east to New York and southeastern Ontario.

Habitat: Restricted to Great Lakes shores, mostly on sandy beaches, sand spits, sand dunes, and sandy ridges; less commonly on gravelly or rocky beaches. It also inhabits marshes in damp swales between dunes and on low sand flats, and is only occasionally found in open woods on older dunes and sandy prairies near the lakeshore.

Associates: *Ammophila breviligulata*, *Arabis lyrata*, *Arctostaphylos uva-ursi*, *Liatris aspera*, *Selaginella rupestris*, *Solidago nemoralis*, *Sporobolus heterolepis*, *Schizachyrium scoparium*, *Tephrosia virginiana*.
Artemesia campestris, Calamovilfa longifolia, Cirsium pitcheri, Elytrigia dasystachya var. psammophila, Hudsonia tomentosa, Juniperus communis, Lathyrus japonicus, Schizachyrium scoparium, Tanacetum huronense.

Prunus pumila var. susquehanae Willd.—Appalachian Sand Cherry

Distribution: Map 3; Minnesota and southwest Ontario east to Maine, south to Wisconsin, Indiana, and in the Appalachian Mountains and Piedmont to New Jersey and Pennsylvania, with outlying populations in Virginia, North Carolina, Tennessee, and Arkansas.

Habitat: Strongly associated with pine, typically growing in dry sandy soil under an open canopy of jack pine often mixed with northern pin oak. Today it can also be found in areas lacking pine, such as sandy fields, barrens, and road-sides, where the original vegetation was a jack pine forest or barrens. In Wisconsin this variety is almost exclusively found on the excessively drained sandy soils of soil region “C” in the central part of the state and region “H” in the northern part. These soils formed on glacial outwash plains and in the bed of glacial Lake Wisconsin. Variety susquehanae also inhabits sandy and rocky shores of rivers and lakes, and establishes itself on the shallow sandy soils on sandstone cliffs and ledges. In New England and the mid-Atlantic States it oc-
cupies acidic sandy soils from dry mountain slopes to wet lakeshores and marshes.

Associates: Arctostaphylos uva-ursi, Aronia melanocarpa, Chimaphila umbellata, Corylus americana, Comptonia peregrina, Epigaea repens, Gaultheria procumbens, Helianthemum canadense, Koeleria macrantha, Lithospermum canescens, Melampyrum lineare, Pinus banksiana, Pteridium aquilinum, Quercus ellipsoidalis, Vaccinium angustifolium.

Prunus pumila var. depressa (Pursh) Bean—Prostrate Sand Cherry

This variety grows on rocky or sandy shores of rivers and lakes from Quebec’s Gaspé Peninsula west to Lake Superior and south to Pennsylvania. It does not occur in Wisconsin or its neighbors, the possible exception being Drummond Island, Michigan. Plants from Wisconsin previously referred to this variety are decumbent or even prostrate forms of the other varieties, especially var. pumila. I have seen such plants growing on the dunes of Lake Michigan at Point Beach State Forest and at Kohler-Andrae State Park. Unfortunately, I have not searched Drummond Island, Michigan, from which I have seen herbarium specimens that were impossible to assign to either var. depressa and var. pumila with certainty. Variety depressa does occur on similar dolomite pavements nearby on Manitoulin Island, Ontario.
Although progress has been made in clarifying the distribution and habitat of sand cherries in the Midwest, there are still specimens of uncertain affinity. About 10% of the specimens that I examined from across the geographic range of the sand cherry were difficult to identify because of incongruence between key characters. Most of these were from the Midwest. Indeed, it is not surprising that faced with these problematic specimens, Midwestern botanists often opted for recognizing only a single variable species without subspecific taxa. Below I describe some of the problems that remain in identifying sand cherries in Wisconsin and its neighbors.

**Distinguishing var. *susquehanae* from the other varieties**

Although var. *susquehanae* is morphologically the most easily distinguished of the four varieties, not all specimens examined had twigs that were either densely pubescent as in var. *susquehanae* or completely glabrous as in the other varieties. Some specimens had hairs that were sparse and even shorter than those of var. *susquehanae*. Based on leaf size, leaf shape, habitat, and locality, the majority of these specimens were determined as var. *besseyi*, but others were closer to var. *susquehanae*. It is possible that this intermediate pubescence is evidence of hybridization between these two taxa, especially in the Midwest where their ranges meet and overlap slightly.

Particularly problematic were specimens from the border between Minnesota and Ontario (especially around Rainy Lake) and scattered across northern Wisconsin and northern Michigan. Here dense twig pubescence shows only modest correlation with broader leaves and obtuse apices. Some specimens have pubescent twigs but elliptic leaves with acute apices; others have obovate leaves and obtuse apices but glabrous twigs. I mapped all of these specimens with glabrous twigs as var. *besseyi* (Map 1; solid squares). These and other eastern outliers from the main range of var. *besseyi* may be remnants from warmer and drier Pleistocene times. Or they may have been transported eastward by Native Americans at sometime in the past (Reznicek, 1983). It is possible that the broader leaves and blunt apices are evidence of gene flow from var. *susquehanae*. Or perhaps these are simply glabrous individuals of var. *susquehanae*.

**Distinguishing var. *besseyi* from var. *pumila***

The morphological characters used to separate these varieties are overall leaf shape, apex shape, base shape, l/w ratio of the leaves, plant habit, and fruit diameter and taste. As discussed earlier these characters are either ambiguous or continuous between the varieties. In their key Catling et al. (1999) give clearly disjunct l/w ratios as a key character (leaves 3.3–10× as long as wide for var. *pumila* and 1.6–2.5× as long as wide for var. *besseyi*). Although I agree that leaf shape is the best morphological character separating the two varieties, my measurements indicated broad overlap between their l/w ratios. In fact, 61% of the 74 specimens of these two taxa measured from Wisconsin had leaf blades between 2.5 and 3.3× as long as wide, thus falling outside the range of values used
in their key to identify them. The average l/w ratio measured for leaves of var. besseyi both in Wisconsin and elsewhere was 2.89:1 (Table 1).

How then can these two varieties be distinguished? Determination of flowering specimens without leaves, and even many with leaves, was done on the basis of habitat and locality. I restricted var. pumila to the shores of the Great Lakes. I have seen, however, a series of specimens inhabiting the sandy soil of prairies, dunes, and bluffs along the Mississippi River (Newport, MN; Pepin, WI; Wabasha, MN; New Albin, IA, and Fulton, IL) with leaves much more like those of var. pumila than typical var. besseyi. The leaves are narrowly elliptic to oblanceolate with acute apices and long-tapering bases, and their leaf blade l/w ratios are at least 3.5:1 (average = 3.84:1). The twigs are completely glabrous. Specimens with similar leaves were found elsewhere scattered within the range of var. besseyi (Map 1; stars).

**ACKNOWLEDGMENTS**

Hugh Iltis encouraged me to take a second look at Wisconsin’s sand cherries. Paul Catling and Tony Reznicek willingly discussed their knowledge of sand cherries with me via email. Curators of the following herbaria were gracious in loaning specimens: APCR, ARIZ, DUKE, IA, ILLS, IND, MICH, MIN, MO, NCU, OSH, POM, RSA, UARK, UC, UWEC, UWSP, WIS, and WMU. Undergraduate students at UWEC that helped with specimen curation as well as data acquisition and management include Christa Eastvold, Kelly Leinberger, Sabrina Hanson, and Amy Welbourn.

**LITERATURE CITED**


Bailey, L. H. 1894. The Native Dwarf Cherries. Cornell University Agricultural Experiment Station Bulletin 70. 11 pp + 2 plates.


